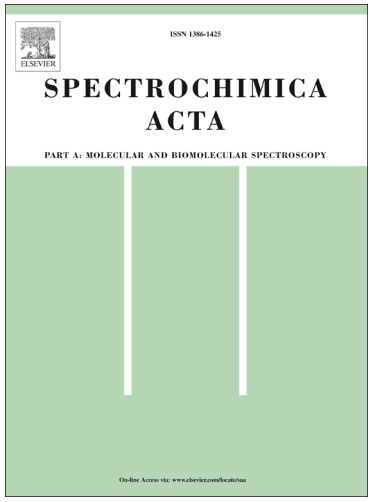

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Revised Manuscript

Green synthesis of Y_2O_3: Dy^{3+} nanophosphor with enhanced photocatalytic activity

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Abstract

Facile and green route was employed for the synthesis of Y_2O_3:Dy^{3+} (1-11 mol %) nanostructures (NSs) using *Aloe Vera* gel as fuel. The formation of different morphologies of Y_2O_3: Dy^{3+} NSs were characterized by SEM, TEM and HRTEM. PXRD data and Rietveld analysis evident the formation of single phase Y_2O_3 with cubic crystal structure. The influence of Dy^{3+} ion concentration on the structure morphology, UV absorption, PL emission and photocatalytic activity of NSs were investigated. NSs exhibited an intense warm white emission with CIE chromaticity coordinates (0.32, 0.33) and average CCT value ~5525 K which corresponds to vertical day light. The control of Dy^{3+} ion on Y_2O_3 matrix influences the photocatalytic decolorization of Metanil Yellow as a model compound was evaluated. The enhanced photocatalytic activities of core shell structured Y_2O_3:Dy^{3+} (1 mol %) was attributed to co-operation effect of dopant concentration, crystallite size, textural properties and capability for reducing electron-hole pair recombination. Further, the recycling catalytic ability of Y_2O_3: Dy^{3+} (1 mol %) nanostructure was also evaluated and found promising photocatalytic performance with negligible decrease in decolorization efficiency even after sixth successive cyclic runs. Considering its green, facile synthesis and recyclable feature from an aqueous solution, the present Y_2O_3: Dy^{3+} (1 mol %) nanophosphor can be considered as one of the ideal photocatalyst for various potential applications.

Keywords: Y_2O_3: Dy^{3+} NSs; Green route; *Aloe Vera* gel; Nanophosphor; Photocatalytic activity

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